

Development of crop production in the Slovakia and Czechia after the year 2004 in comparison with V4 countries

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Abstract. The V4 countries went through a transformation of their entire economies, including the agricultural sector, in the 1990s. Each of these countries approached the transformation of agriculture differently, but later the V4 countries' approach to agricultural development was unified by the EU's common agricultural policy. The aim of the paper was to compare the development of the production (sown area and hectare yield) of selected most commonly cultivated crops in Slovak and Czech regions (NUTS 3) in the period between 2004 and 2017. The development of production in these two countries was also evaluated against the trends of V4 countries. Based on these analyses, common and specific agriculture development trends in V4 countries were revealed. A chronological average was used to evaluate the average values of the monitored indicators in the period from 2004 to 2017 in Slovak and Czech regions. To express the development of the given indicators between 2004 and 2017, the change index was used and visualised cartographically. Regression analysis was used to show the development trends of agricultural production in the V4 countries. In general, the agricultural sectors in the V4 countries show similar characteristics with similar trends, and the average hectare yield has a modest growing trend. In terms of the structure of the cultivated plants, the size of the cultivated areas, the volume of production and the average hectare yields, there have been considerable changes to crop farming in Slovak and Czech regions. The study showed that the changes in the agrarian sector after the year 2004 conditioned by the entry of Czechia and Slovakia into the European Union were reflected in a decrease in crop production and an increase in regional disparities. From the point of view of the production indicator expressing the hectare yield of crops, Czechia achieves better indicator values than does Slovakia.

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1. Introduction

The Visegrad group (also known as the V4) is a political association of four Central European countries: Czechia, Hungary, Poland and Slovakia. The alliance was established after the fall of the communist regime in the year 1991 with the objective of cooperating on the road to European integration. At the beginning of this journey the countries had to tackle the critical situation concerning the transformation of agriculture and they jointly approached the adoption of the common agricultural policy before joining the European Union (the EU). The thesis delves into comparing the individual states on the basis of selected indices. In spite of the fact that the countries have different natural and political conditions for agricultural production, it is possible to detect certain identical trends. In general, crop production in the V4 countries specialises in the production of food, animal feed, and raw materials for the food-processing and pharmaceutical industries and other industrial sectors. The most important group of crops is cereals.

In the past a series of professional articles was written about the development of crop production in the V4 countries (Szabo, Grzmar and Zelina, 2018). Our paper compares in detail Slovakia and Czechia at the NUTS 3 level (regions). The choice of Slovakia and Czechia as objects for a detailed comparison is based on the historical connection of these countries being the greatest among the V4 countries. Until 1993 Czechoslovakia was a sovereign country with common policy rules for agriculture development. Because the previous articles focused

more on the individual states, we focused on comparing the development of agriculture in the two countries. For example, Bodian (1989) wrote about the long-term development of crop production in Slovakia (1989). Věžník (1989) dealt with the production of cereals on the territory of former Czechoslovakia. Comparative studies have been more of an exception. A remarkable study from the socialist period by Jurásek (1987) analysed crop production in the former Czechoslovak Socialist Republic and in the neighbouring countries belonging to the former Council for Mutual Economic Assistance. Šimo (1998) compared the cultivated areas and reviewed the development of hectare yields in the Czech Republic (CR) and the Slovak Republic (SR) as well as selected CEFTA countries and the EU.

Even in modern history, supranational analyses of countries are not very common, and the development of crop production is most frequently evaluated for individual states. (e.g. Lithuania – Kriščiukaitienė et al., 2009; Greece – Psaltopoulos, Balamou and Thomson, 2006; Slovakia – Némethová, Dubcová and Kramáreková, 2014, 2017; France and Germany – Kepker, 2006). Authors comparing several states usually review agricultural development in the old (EU-15) and the new (EU-13) member states. One example is the paper by Latruffe et al. (2012) that examines the differences in technical efficiency and change in efficiency between French and Hungarian farms in the segments of milk, cereals and oil-bearing plants. The result of the thesis particularly adverts to the technological differences between the states. Scricciu (2011) worked on a similar topic in the new EU member states. Ramniceanu and Ackrill (2007), too, focused

on the comparison of agriculture in the new member states. They especially dealt with the development and the impact of the Common Agricultural Policy (CAP) on the development of agriculture and rural regions. The issue of agriculture and development of agricultural enterprises in the new EU member states is generally covered in the anthology led by Buchenrieder and Mollers (2009). In it, the authors present research on the number and size of agricultural enterprises and their economic situation. They further examine the impact of technologies on agriculture and the differences in applying them. Technological differences in agriculture are felt more intensely in animal husbandry than in crop production. Čechura et al. (2017) looked into milk production and the lagging-behind in technology of some NUTS-2 regions. The lowest productivity is observed in Eastern European countries. The authors also emphasise the fact that the differences between production in the western and eastern regions of Europe do not diminish.

The presented paper focuses on the V4 region and emphasises the CAP and its impact on the productivity of individual states. Ramniceanu and Ackrill (2007) have a similar view on the effect of CAP and its impact on the productivity of individual states. In Poland the topic was covered by Wasilewski and Madra (2008). Rudnicki (2009) hints at the deepening regional disparities in Polish agriculture. In the Czech Republic a similar topic was dealt with in the works of Kabrda and Jančák (2007) and by Slovakia Spišiak et al. (2005), Némethová, Dubcová and Kramáreková (2014, 2017), Némethová and Cíváň (2017) and Némethová, Midler and Cíváň (2018).

The most significant structural change recorded for crops grown on arable land is the decline in production of pulses, potatoes and sugar beets in favour of crops with higher market demand, in particular oil-bearing plants and maize. According to Chrastinová and Uhrinčáťová (2014), crop production in Slovakia achieves better long-term results than livestock production, which is declining due to its low competitiveness related to the economic conditions of production and lower capital and technological equipment of Slovak farms. This trend in agricultural activities leading to the development of crop production at the expense of livestock produc-

tion has a negative impact on the development and competitiveness of agriculture and food self-sufficiency of Slovakia in meat production.

Interesting results influenced by the CAP are presented in the study by Kotyza and Slaboch (2014), which primarily analyses the level of self-sustainability of the Czech Republic and Poland in selected commodities, while particular attention was paid to basic cereals, oil-bearing plants, maize and potatoes. With most of the aforementioned commodities the trend in the level of self-sustainability is either stable or increasing. In the Czech Republic only the production of potatoes is approaching a critical level. Hýblová and Skalický (2018) in their study examined the interrelation between wheat yields, return on sales and size of the farm in agrarian entities in the EU member states. The outcome of the research shows that the return on sales decreases in relation to the size of the farm, while the wheat yield per hectare increases. Due to the impact of the CAP in the V4 countries, the food-producing function of agriculture is being pushed into the background and the landscape designing function and protection of the environment in particular are coming to the fore. This shift from productivism to post-productivism was examined by Věžník, Král and Svobodová (2013). Within the scope of this shift in the V4 countries there is also a very lively discussion about the issue of production of industrial crops, and especially oil-bearing plants. For instance, Kotyza (2015) analyses the competitiveness of selected V4 countries in oil-seed rape and sunflower production, the conclusion being that European policy in the field of biofuels had a significant impact on production volumes in all the analysed countries. The harvested area rose from 3% to 9%. All the V4 countries prove to be self-sustainable in the production of oil-seed rape. The trade balance data demonstrate high competitiveness in the export of this commodity to Western Europe as a raw material, which leads to the countries losing potential profits from processing the commodity themselves.

According to Duričová (2014), sustainable agriculture and rural development are important aspects being accentuated at present and they are being considered in the drafting of the new agricultural policy that will enable its potential to be fully exploited and actively contribute to protecting the environment. The ecologisation of agricul-

ture, nature protection and ecological stability of a country are a global concern (Petrovič et al., 2017; Boltižiar et al., 2016; Ivanová et al., 2013).

The aim of the paper was to compare the development of the production (sown area and hectare yield) of selected most commonly cultivated crops in Slovak and Czech regions (NUTS 3) in the period between 2004 and 2017. The development of production in these two countries was also evaluated against the trends of V4 countries. These analyses revealed common and specific agriculture development trends in V4 countries.

2. Data and research methods

The basic statistical set consisted of official data of the Slovak Statistical Office and the Czech Statistical Office relating to crop production indices for the period between the years 2004 and 2017. The data were analysed at the level of the V4 countries and NUTS-3 regions of Slovakia and Czechia.

The reference index at the level of the V4 countries was the hectare yield of selected crops in crop farming and at the level of the regions of Slovakia and Czechia, the size of sown area, the volume of production and the hectare yield of the selected crops and their changes in the course of the evaluated period between the years 2004 and 2017. In order to define the development of the given index between the two time periods of the years 2004 and 2017 we used the change index, which best displays the differences in the development of the indices (increase, decrease) between two time periods. We also cartographically visualised the results of the index change of the size of the sown area and crop production.

The trends in the development of agricultural production translated into the crop yield per hectare (cereals, legumes, potatoes, oil-bearing plants and sugar beet) of the V4 countries are illustrated in graphs and analysed by regression analysis.

The average values of the indices under review we calculated as chronological average of the years 2004–17. We cartographically interpreted the average hectare yield of selected crops at the level of the regions of Slovakia and Czechia.

3. Results

3.1 Comparison of the V4 countries on the basis of hectare yield of selected crops

The trends in the development of agricultural production in the V4 countries based on regression analysis are shown below. In spite of the fact that the time series for the evaluation is still relatively short (this is proven by the low value of the R^2 index in the graphs), it presents an interesting view of the development of crop production. The hectare yield (expressed in t/ha) is a suitable relativised index for comparing the development of crop production.

The hectare yields of cereals differ among the V4 countries – they were consistently lowest in Poland (min. 2.60 t/ha in the year 2006), while in the remaining three countries they are practically the same. Hungary reached the highest hectare yield in the year 2016 (6.47 t/ha). The average range of variation between the lowest value (consistently Poland) and the highest (Hungary/Czechia) of the hectare yield in the V4 countries during the evaluated period is 1.91 t/ha. Although after accession to the EU cereal yields fluctuate in all countries, the regression line of the polynomial type in the individual years indicates a moderately increasing trend in the hectare yields of cereals in all the V4 countries (Fig. 1).

The hectare yields of legumes show high fluctuation over the reference period – the lowest values of legumes yields in the majority of the years were recorded in Slovakia, and the highest were most frequently reported in Hungary. The highest value of the hectare yield was reached in the year 2004 in Czechia (3.11 t/ha), and the lowest (1–36 t/ha) in 2012 in Slovakia. The average range of variation during the reporting period in the V4 countries was 0.58 t/ha. The difference in the hectare yields of the countries is not as big as it was in the case of cereals. The regression trend line suggests that upon the V4 countries' entry into the EU the production of legumes was relatively high. However, it gradually dropped to minimum levels during the period 2009–12. After this period it goes up, though in none of the countries did it reach the levels from the time of joining the EU (Fig. 2).

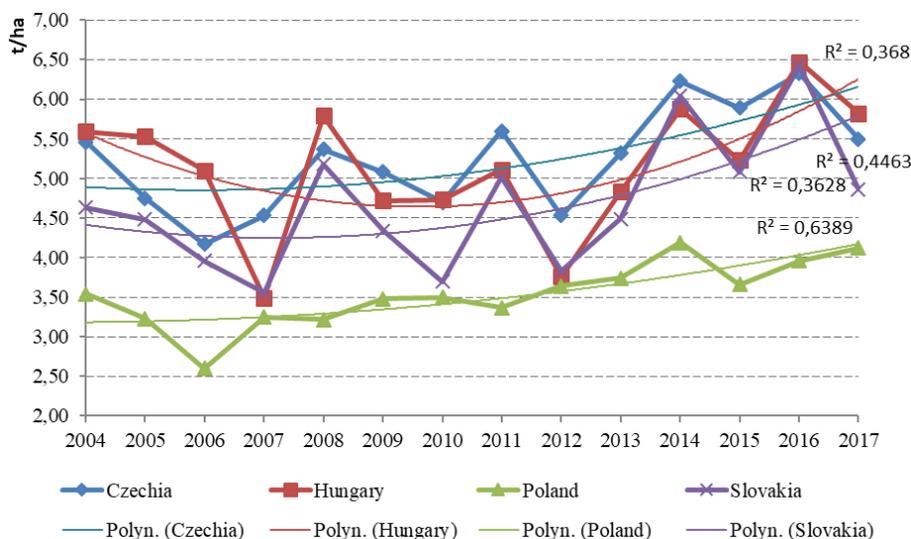


Fig. 1. Development of cereal yields in the V4 countries, 2004–17 (polynomial trend line)

Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

The situation in potato yields is identical as with the previous crops, i.e. the lowest values in all the years were recorded in Slovakia, and the highest in Czechia or Hungary. The highest hectare yield was recorded in 2011 in Czechia (30.45 t/ha), and the lowest (11.46 t/ha) in 2010 in Slovakia. The average range of variation during the reference period in the V4 countries is 9.3 t/ha. The regression trend line shows different trends in different countries. While Czechia and Slovakia show a very moderate increase, Poland records a relatively significant increase; nonetheless, the development in Hungary shows a moderate decrease in hectare yields (Fig. 3).

Of the given crops, sugar beet has the yields most vulnerable to physiographic conditions, so the fluctuation in the hectare yields during the year is most visible. In the years 2004–15 the hectare yields were highest in the Czech Republic most frequently, in Hungary in some years, in Slovakia in 2016 and Poland in 2017. The average range of variation during the reference period in the V4 countries is 9.5 t/ha. The regression line in all the countries shows a relatively significant increase in hectare yields (Fig. 4).

The hectare yields of oil-bearing plants were stable in the course of the reporting period – they range from the minimum value of 1.86 t/ha in the year 2010 in Slovakia up to 3.54 t/ha in 2014 in Czechia. The average range of variation in the V4 countries only equals 0.6 t/ha (Fig. 5).

3.2 Comparison of sown area, production and hectare yield of selected crops in Slovak and Czech regions

With regard to the historical and political connection between the Czech and Slovak Republics the following sections will deal in detail with identical and diverging trends in the development of crop production exclusively in these two countries. The importance of the cultivation of both cereals and oil-bearing plants in Slovakia and in Czechia is likely to increase in the coming years. The reason is mainly their non-food utilisation in view of the expected demand for these crops on the part of domestic and foreign producers of biofuels. According to the chronological average of the years 2004–17 cereals are grown on a sown area of 762,000 hectares in Slovakia and 1.4777 million hectares in Czechia. The top regions for growing cereals in Slovakia are Nitra and Trnava, and in the Czech Republic cereals thrive mainly in the Central Bohemian and South Moravian regions. When comparing the years 2004 and 2017, the sown area of cereals in both countries went down, by 12.0% in Slovakia and by more (-15.9%) in Czechia (Fig. 6).

According to the chronological average of the years 2004–17 3,576.2 tonnes of cereals were produced in the Slovak Republic and 7,719.3 tonnes in the Czech Republic. In terms of the production of

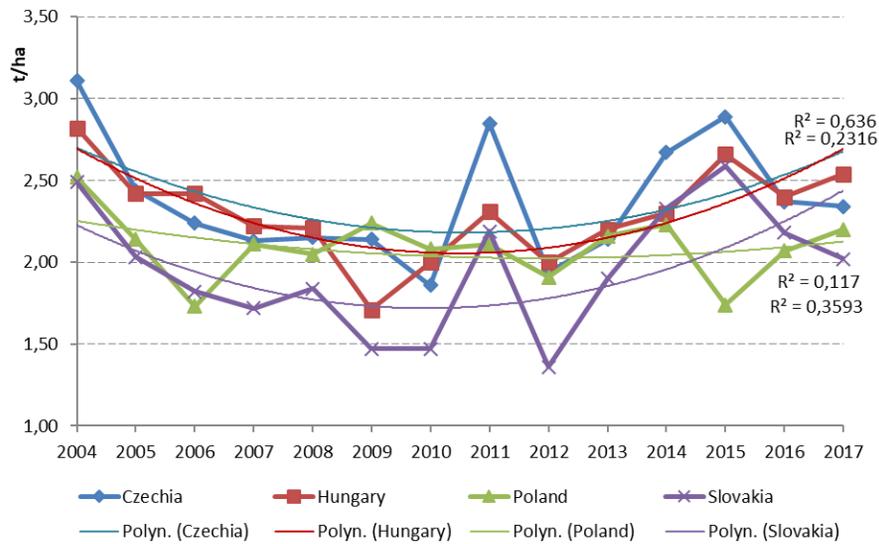


Fig. 2. Development of legume yields in the V4 countries, 2004–17 (polynomial trend line)
 Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

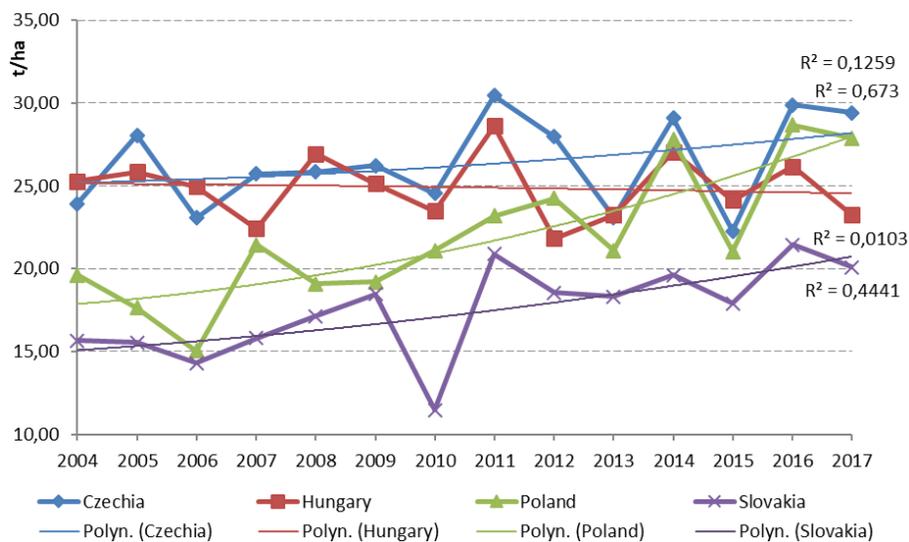


Fig. 3. Development of potato yields in the V4 countries, 2004–17 (polynomial trend line)
 Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

cereals in Slovakia and Czechia, the regions with the biggest sown area lead the way. The decrease in the sown area of cereals was also influenced by the decrease in the production of cereals in several regions in both states (Fig. 7). A bigger decrease in production was seen in the Czech Republic (-15.1%) than in Slovakia (-8.2%). The most suitable index for comparing the production of crops in the individual states and regions respectively is the application of the hectare yield. The index hints at the profitability of the cultivation of a given crop. The average value of cereal yields in Slovakia in the period from 2004

to 2017 amounted to 4.69 t/ha, while in Czechia it was slightly higher, at 5.23 t/ha. In Czechia, most regions record higher values of hectare yield than in Slovakia (Fig. 6).

Slovakia (178,700 ha) recorded a higher value of sown area of grain maize than Czechia (100,900 ha). In terms of growing maize, the regions with larger cultivated areas of cereals stand out. In Slovakia the sown areas increased almost by 30%, while in Czechia they decreased moderately, by 4.4%. The decrease was recorded in several Czech regions. In most Slovak regions the sown areas increased

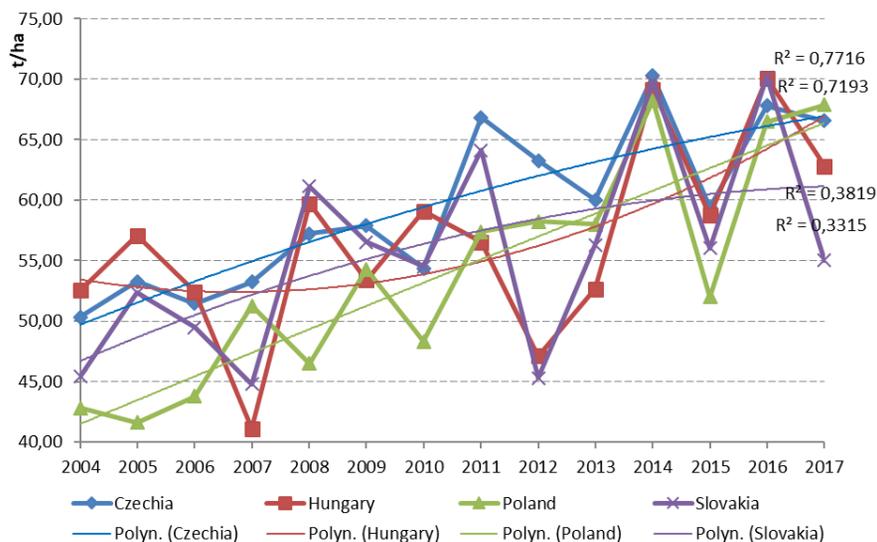


Fig. 4. Development of sugar beet yields in the V4 countries, 2004–17 (polynomial trend line)
 Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

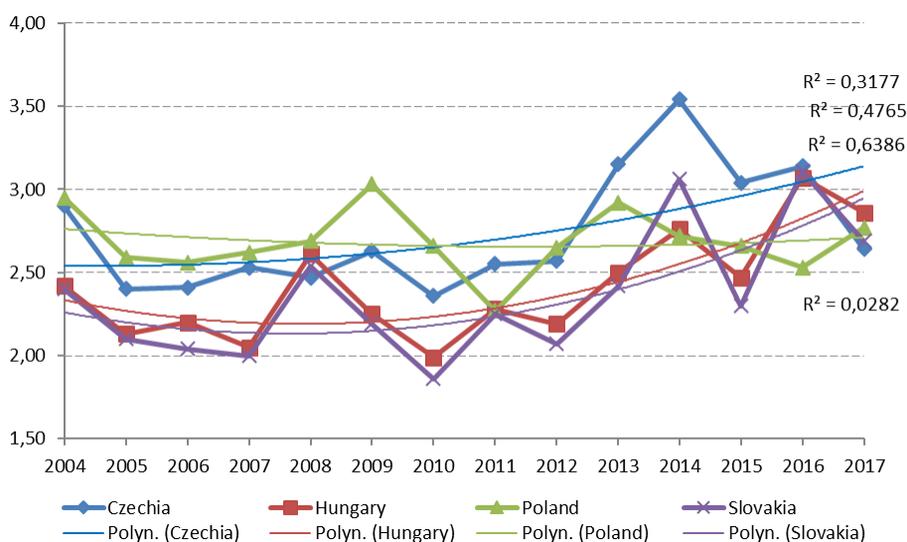


Fig. 5. Development of oil-bearing plant yields in the V4 countries, 2004–17 (polynomial trend line)
 Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

(Fig. 6). The increase of the sown area of maize is related to the increase in production, which in Slovakia was 23.6% and in Czechia only 6.6%. A number of regions in the northern part of each country recorded increased production of this crop (Fig. 7), while in more southerly regions production decreased. Due to global warming, in more northerly regions thermophilic plant species such as grain maize and oil-bearing plants started to be grown. In the period under review the average value of maize production was 1,143,200 tonnes in Slovakia and only 759,000 tonnes in Czechia. It is positive that in

both countries and in the regions the hectare yield goes up, while Czechia records higher values, the average for the years 2004–2017 (7.50 t/ha) and in Slovakia the values are lower (6.39 t/ha) (Fig. 7).

The sown areas of multiannual fodder crops in Czechia reach far higher values (average value – 443,300 ha, in comparison with Slovakia 147,900 ha). However, an increase in sown area between 2004 and 2017 was only seen in Slovakia (10.5%) and several of its regions. The reverse situation held in Czechia, where the sown area decreased by 7% and the decrease in the cultivated areas was seen

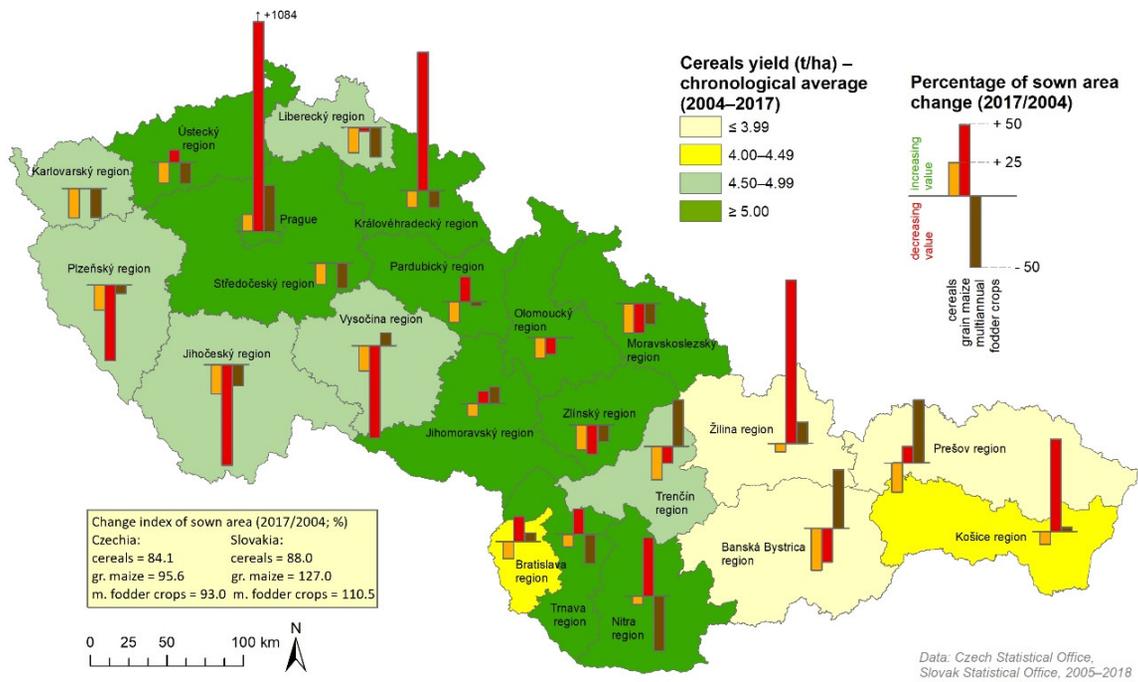


Fig. 6. Development of sown area of cereals, grain maize and multiannual fodder crops in Czech and Slovak regions
Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

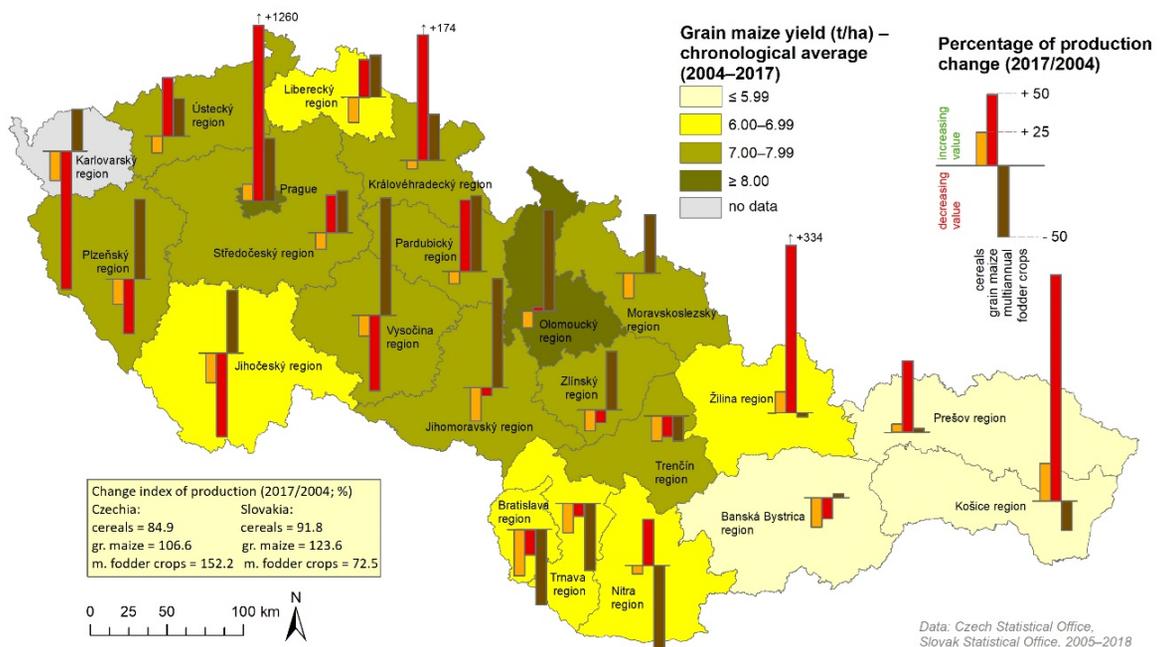


Fig. 7. Development of the production of cereals, grain maize and multiannual fodder crops in Czech and Slovak regions
Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

in most of the regions (Fig. 6). In spite of this decrease, the production of multiannual fodder crops in Czechia rose by more than 50%, and it grew in all the regions. In Slovakia the production went down by 27.5%, and only in two regions did multiannual fodder crops increase moderately, by 3%. In the remaining Slovak regions production fell (Fig. 7). In Czechia, according to the chronological average of the years 2004–17 up to 2,950,100 tonnes of fodder crops were produced, and in Slovakia only 653,100 tonnes. In Czechia all the regions reached a hectare yield of this crop in excess of 6 t/ha (CR average – 6.72 t/ha). In Slovakia only the two regions that are agriculturally most exploited – the Nitra and Trnava regions – reached a hectare yield value of over 6 t/ha (SR average – 4.46 t/ha).

Not only the sown area of cereals and multiannual crops but also the areas of legumes will have to increase, as they are important fodder crops for animal husbandry. In both countries we observed a long-term decline in animal husbandry. The drop in the number of individual types of farm animals started already in the first half of the 1990s and the numbers continue to decrease. The instruments of the EU Common Agricultural Policy motivated the farmers to reduce animal husbandry

and develop more crop production orientated at growing large-area crops (cereals and oil-bearing plants), and especially crops used for energy production. The funding of the European Union in the 2014–20 programming period focuses on revitalising the declining animal husbandry. According to the chronological average, between the years 2004 and 2017 legumes were grown on an area of 10,900 ha in Slovakia, and on a larger area, up to 29,000 ha, in Czechia. When we compare the years 2004 and 2017 the sown areas in Slovakia decreased by 15.6% (Fig. 8). The situation in Czechia is more favourable, as the sown areas of legumes rose by up to 50.9%. In all the regions the sown areas grew (except for the Vysočina region), while an increase of more than 200% was seen in the Prague and Moravian-Silesian regions (Fig. 8). In spite of the big increase in the sown areas in Czechia the production of legumes increased by 13.8%, while in Slovakia it clearly dropped (-31.4%). The situation in the individual regions of Czechia and Slovakia is shown in Fig. 9. In Czechia 68,200 tonnes of legumes were produced (average for the years 2004–17) and in Slovakia 21,100 tonnes. Czechia records significantly higher legumes yields (average – 2.35 t/ha) than Slovakia (average – 1.99 t/ha) (Fig. 8).

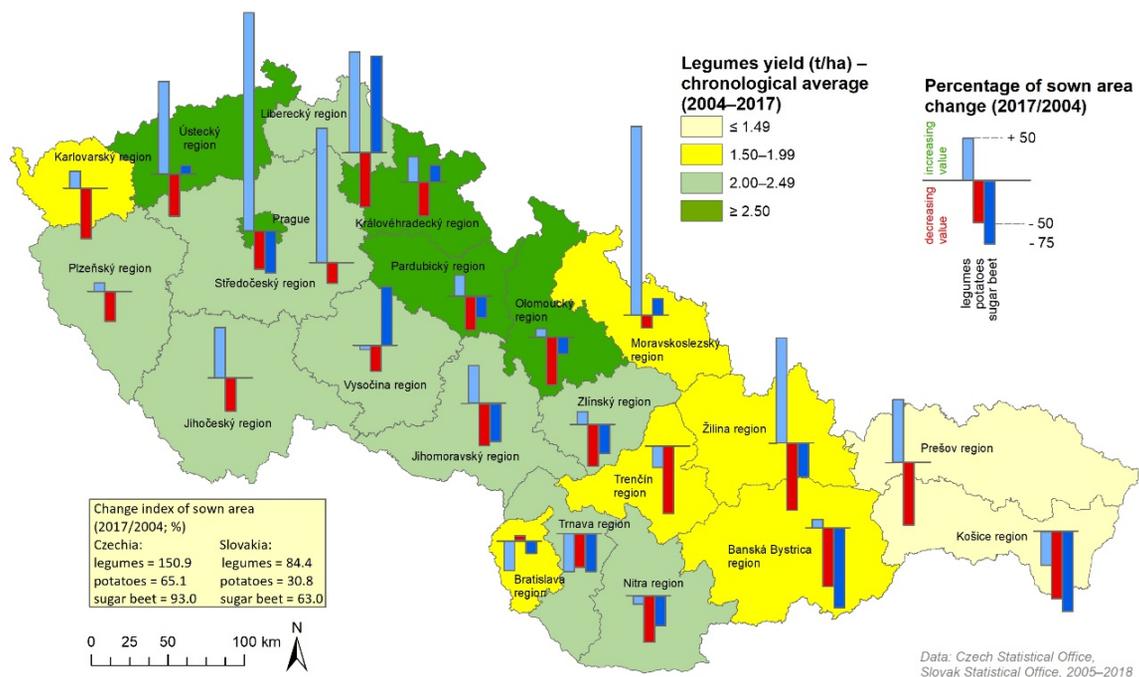


Fig. 8. Development of sown areas of legumes, potatoes and sugar beet in Czech and Slovak regions
 Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

The growing of potatoes in Slovakia is gradually vanishing despite the natural conditions being suitable for their growing. After Slovakia’s accession to the EU the sown areas of potatoes gradually decreased. During the period 2004–17 they fell by up to 69.2%. The situation in potato growing is more favourable in Czechia, despite a decrease in the sown area (-34.9%). The sown areas of potatoes gradually went down in all the regions in both countries, except for a moderate increase (of 6%) in the Bratislava region (Fig. 8). In the period between the years 2004 and 2017 potatoes were grown on an area of 12,400 ha in Slovakia and up to 27,400 ha in Czechia. The situation is similar in the production of potatoes. Slovakia saw a more visible drop in production (-60.8%) than did Czechia (-20.1%) (Fig. 9). Czechia on average produces 722,600 tonnes of potatoes, but Slovakia only 211,800 tonnes. The majority of the Czech regions record an average potato yield over 25 t/ha (CR average – 26.4 t/ha) (Fig. 9). In Slovakia only two regions reach an index value exceeding 25 t/ha, while the average value for SR only amounts to 17.6 t/ha.

Another crop that is gradually disappearing in Slovakia is sugar beet (a decrease of 37%). In Czechia the reduction of the sown areas of this crop is more moderate (-7%). The average value of the sown areas of sugar beet in Czechia is significantly higher (59,400 ha) compared to Slovakia (21,300 ha). All Slovak regions recorded a drop in the sown areas and in the Prešov region sugar beet is no longer grown (Fig. 8). In Czechia, five regions saw an increase, while in the Liberec region an increase over 100% was recorded. The crop is not grown in the South Bohemian, Plzeň and Karlovy Vary regions. In Slovakia the production of sugar beet decreased (-23%) but in Czechia it increased by 22.9%. Between the years 2004 and 2017 in the Czech Republic an average of 3,536,600 tonnes of sugar beet were produced, while in Slovakia it was only 1,183,400 tonnes. The production of sugar beet went up in the majority of the Czech regions, but in only two regions of Slovakia (Fig. 9). Both countries record roughly identical average sugar beet yields (CR – 59.5 t/ha and SR – 56.2 t/ha), while higher values of the index (over 58 t/ha) were recorded in the Czech regions.

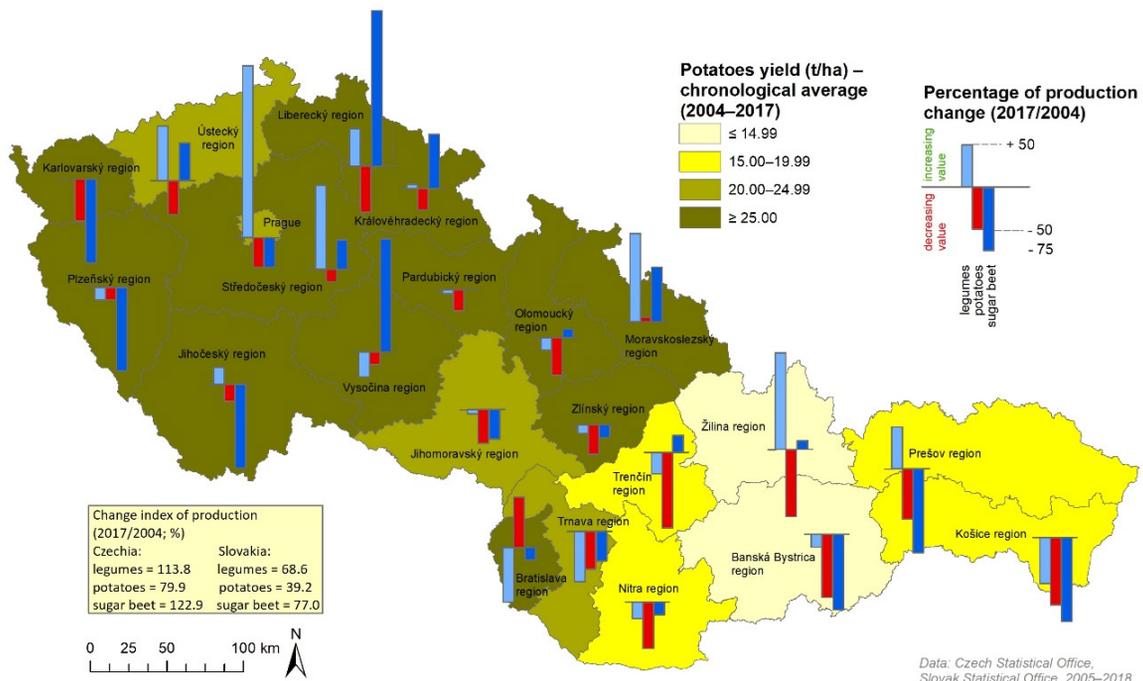


Fig. 9. Development of production of legumes, potatoes and sugar beet in Czech and Slovak regions
 Source: The Slovak Statistical Office and the Czech Statistical Office, 2019, own data processing

4. Discussion

The Czech and Slovak governments went through difficult times when preparing for their countries' integration into the European Union. The agrarian sector had cherished great expectations from accession to the EU. Unfortunately, expectations were far from met. On the contrary, the uneven business environment accompanied by massive importation of food often of dubious quality by foreign chain stores took its toll by attenuating domestic agricultural and food production. At the beginning of the 1990s politicking prevailed over the interest of national economy, and ideas of prosperous Czech and Slovak rural regions with small family farms took on an absolute priority. Other forms of husbandry found themselves being discriminated against and their existence was at stake. This was particularly true of large-scale production businesses operating on soil. The Agrarian Chamber, which was established at that time, had to work hard and advocate a balanced approach of the state to all forms of business that would be approximately equal regardless of the size of the enterprise.

At the end of the 1990s it became evident that not only had this idea totally collapsed but so too had the concept of an agrarian reform, which basically relied on price deregulation, restrictive financial policy and the self-regulating forces of the market. The political discussions in those days caused a degradation of the peasant's status and for a relatively long period the slogan that was later promoted, that "if we do not produce food, we will import it", curbed the support of prominent politicians and thus the development of agriculture and the food processing industry. At the turn of the century agricultural experts, but also the wider public, called for the approach to be rectified in the subsequent process of privatisation of agriculture in such a way as to create an adequate capital participation and capital interconnection between agricultural production and the manufacturing industry and services. Unfortunately, the executive and legislative power did not want to hear of this, which later proved to be a strategic mistake. This problem ranked later on among the problems that largely contributed to the long-term unfavourable development of the Czech and Slovak agricultural and food economy.

The Common Agricultural Policy of the EU in fact increased the competitiveness of agriculture of the V4 countries but the strong competitive set of the European market meant that the agricultural sector of the V4 countries was not as competitive as the agriculture in the old EU-15 member states, due to a lower level of subsidies (Némethová, Dubcová and Kramáreková, 2014). Increasing income stability of agricultural enterprises is one of the key objectives of the Common Agricultural Policy of the European Union, which deploys a large portion of its budgets in the form of subsidies for supporting and stabilising the income of its farmers (Bojnc and Fertő, 2019).

So far, we can be disappointed about the fact that not even the reform of the EU Common Agricultural Policy after the year 2013 has succeeded in levelling the differences in agricultural subsidies between the old and new member states. From the state's perspective, it must be regarded as inadmissible that the Czech and Slovak Republics are practically bottom of the list in the EU when it comes to food safety. The research of many expert institutions confirmed that at present practically 50% of groceries being sold in these countries are imports that replace domestic goods. It is not only irreplaceable commodities that are not produced in Czechia and Slovakia, but also commodities that used to be produced in the countries for their home market. Suppressing domestic producers from the counters of chain stores led to a significant reduction in Czech and Slovak production. Due to this development the countries practically lost their self-sustainability in all commodities and became dependant on importation. After joining the EU the structure of production in most countries of Central and Eastern Europe changed. After the reduction in animal husbandry in particular it is crop farming that is gradually gaining the upper hand and extensive forms of farming are expanding (Věžník, Král and Svobodová, 2013). The specialisation of crop production in Slovakia and Czechia is based on the principles of sustainable development. As far as the structure of sowing is concerned the share of crops with production of raw materials for non-food and other industrial utilisation is increasing. The development of bioenergetics and the continuing climatic changes speak in favour of the fact that the share of cereals and oil-bearing plants on arable land is go-

ing to rise. In the sowing structure the growing of multiannual fodder crops is becoming stable, provided that cattle numbers do not continue to drop. A negative aspect in the crop farming in Slovakia and Czechia is the decrease in the sown areas of potatoes and in Slovakia also a drop in the sown areas of sugar beet.

Nowadays in Slovakia and Czechia, more emphasis should be placed on growing fruit, vegetables, potatoes, grapes, etc. – generally, on the production of crops with higher added value. Cultivation of these crops also has a positive impact on job creation in agriculture and increases labour productivity (Némethová, Midler and Cíváň 2018). The EU's Common Agricultural Policy (CAP) provides financial subsidies for activities promoting diversification in rural development programmes. The main objective of these programmes is to improve the quality of life in rural areas and to support the rural economy. Increase in diversification rates and expanding the European multifunctional farming model are seen as the best solutions to the agricultural crisis (Czimbalmos, Kovacs and Fehér, 2013). Still there are significant shortcomings in the rural economy in V4 states. Variety in agriculture is becoming a key factor in achieving the nation's food security and increasing rural employment. Large farms tend to diversify production into non-agricultural activities. These agriculture enterprises have more resources to devote to other activities such as agriculture itself.

In the next EU's programming period of 2021–27 the sectoral structure of agriculture, which rests on dominating crop production, will need to be changed. Support for added-value crop production and support for livestock production is essential. Ecology in agricultural production according to GAEC (greening programme, climate and environmental measures, food safety and quality, agricultural diversification and support for young farmers to support innovation processes in the agricultural sector) is becoming a priority of the European Union. In this regard, young farmers are more open to applying new innovative technologies and processes in agriculture production.

The Czech and Slovak Republics need their own agricultural policy that will secure equal conditions and opportunities for all forms of husbandry. We cannot adopt all the directives and regulations of

the European Commission within the Common Agricultural Policy of the EU without any vision of where the national agriculture is heading. We cannot ignore the trend in the world, which also concerns the EU, where the average concentration of agricultural and food enterprises is seen. Let us differentiate only among enterprises that generate benefit for the whole society and create added value without judging their forms and sizes. It is vital to pay sufficient attention to the protection of the land resources from nonsensical occupation of arable land or its speculative sale to foreign investors.

5. Conclusion

In general, the agricultural sectors in the V4 countries show similar characteristics and trends. This development is closely related to the cohesion of these countries not only in the agrarian sector. The thesis as presented confirms this fact by analysing the principal agricultural commodities. Within the remaining V4 countries in the reporting period between the years 2004 and 2017, Poland reports the lowest cereal yields despite the fact that according to the change index 2017/2004 they increased most. When comparing the average legume yields it is Slovakia that reports the lowest values. In all the V4 countries legume yields dropped. Slovakia also records lower average potato yields. In all the V4 countries except Hungary according to the change index 2017/2004 potato yields increased. Sugar beet yields are increasing and, of the V4 states, Czechia reports the highest average value during the whole reference period. As for oil-bearing plants, which are an important cash crop, the hectare yield dropped in Czechia and in Poland. The aforementioned states recorded higher values of the average hectare yields of oil-bearing plants over the period between the years 2004 and 2017. Slovakia is characterised by the lowest average hectare yields.

If we more closely compare the regional differences in the Czech and Slovak Republics, the results vary more. Also in this case we detect similar trends in the development of agricultural production, and this mainly in the generally most fertile regions in both states (the Trnava and Nitra regions in Slovakia and the South Moravian and the Cen-

tral Bohemian regions in Czechia). The decline in the sown areas and the production of cereals in Slovakia is comparable with the drop in Czechia. As far as grain maize is concerned, Slovakia records higher values of sown areas and production than does Czechia. Slovakia reported a bigger increase in the sown areas and production during the reference period 2004–17. Several northern Slovak and Czech regions reported an increase in growing grain maize. In spite of an increase in the sown areas of multiannual fodder crops in Slovakia the production of this crop dropped. The situation was the reverse in Czechia, where, while sown areas decreased, production increased in all regions. Regional differences are also visible in growing legumes. Most regions in Czechia report an increase in sown areas (extreme examples are the Prague and the Moravian-Silesian regions, which report an increase of more than 200%). On the other hand, almost all Slovak regions have a negative change index, and this is true for both sown area and production. The exceptions are the Žilina and Prešov regions. In both reference countries the sown areas of potatoes decreased, and by approximately 70% in Slovakia. The sown areas of potatoes fell in almost all regions of Slovakia and Czechia. The negative values of the change index also express a drop in the production of potatoes in Slovakia and in Czechia. In Slovakia the decrease in production amounted to more than 60%. In Slovakia the growing of sugar beet is gradually subsiding despite the suitable natural conditions for its production. Sown areas of sugar beet dropped by roughly 40% and production by 23%. The situation looks more positive in Czechia, where in the majority of the regions the production of sugar beet increased. The position of Slovakia seen from the perspective of the production index expressing the hectare yield of crops is weaker. Only in two Slovak regions, Nitra and Trnava, did the higher hectare yields of crops come closer to the values reported in Czechia.

After the accession of Slovakia and Czechia to the EU the governments of both countries minimised the national funding of the agricultural sector relying on subsidies from the CAP budget, which happened to be minimal in the first years and even at present do not reach the level of the old EU member states. This insufficient financial support was reflected in a decline in this sector. In the eco-

nomics policies of Slovakia and Czechia the agrarian sector gradually became less important. The newly forming EU CAP should concentrate on a more equitable subsidy policy for this sector across all EU member states. It is necessary to increase the level of co-financing of agricultural production also on the part of Slovakia and Czechia. The agricultural production in the future will be more governed by demand, i.e. also the total acreage and production of crops in the V4 countries will reflect the market situation and the situation of the common agricultural policy, which is closely linked with the situation on the market. Apart from crop framing specialised in cash crops, i.e. the production of fruit, vegetables, the production of milk and meat will be more supported. This support would contribute to increasing employment in rural regions and strengthening the self-sustainability of the countries in the food processing industry.

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References

- Bodian, J.** (1989). Long - term development of crop production in Slovakia (in Slovak) Dlhodobý rozvoj rastlinnej výroby v SSR. *Zemědělská Ekonomika*, 1989/3: 177–188.
- Bojnec, Š. and Fertő, I.** (2019). Do CAP subsidies stabilise farm income in Hungary and Slovenia? *Agricultural Economics – Czech*, 65(3): 103–111. DOI: <http://dx.doi.org/10.17221/190/2018-Agriceon>
- Boltížiar, M. Olah, B. Gallay, I. and Gallayová, Z.** (2016). Transformation of the Slovak cultural landscape and its recent trends. *Landscape and landscape ecology: proceedings of the 17th International Symposium on Landscape Ecology. Proceedings*. Halada, L., Bača, A., Boltížiar, M (Eds.). Bratislava: Institute of Landscape Ecology SAS, 57–67.

- Buchenrieder, G. and Mollers, J.** (Eds.) (2009). Structural Change in Europe's rural regions. Farm livelihoods between subsistence orientation, modernisation and non-farm diversification. *Studies on the Agricultural and Food Sector in Central and Eastern Europe*, 49. Halle (Saale).
- Czimbalmos, R. Kovács, G. and Fehér, A.** (2013). Multifunctionality and farm concentration in Hungary. *Research Journal of Agricultural Science*, 45(2): 52–60. ISSN 2668-926X.
- Čechura, L. Grau, A. Hockmann, H. Levkovych, I. and Kroupova, Z.** (2017). Catching Up or Falling Behind in European Agriculture: The Case of Milk Production. *Journal of Agricultural Economics*, 68(1): 206–227. ISSN 0021857X.
- Đuričová, I.** (2014). Support policy of agriculture evaluation in the Slovak Republic in 2004 – 2012 (in Slovak). *Ekonomika Poľnohospodárstva* 14(2): 5–19.
- Hoffmann, Z.** (1965). Changes in the distribution of crop production in Czechoslovakia in 1930–1960 (in Czech). *Zprávy o vědecké činnosti, GÚ ČSAV* (5), Problémy geografie, Brno, 11–18.
- Houška, V.** (1982). Hectare yields of agricultural crops in the Czechoslovak Socialist Republic and in the world (in Czech). *Statistika*, 12/1982: 513–529.
- Hýblová, E. and Skalický, R.** (2018). Return on sales and wheat yields per hectare of European agricultural entities. *Agric. Econ. – Czech*, 64(10): 436–444. <https://doi.org/10.17221/209/2017-AGRICECON>
- Chrastinová, Z. and Uhrinčatová, E.** (2014). Slovak agriculture in the context of the European Union countries. *Ekonomika poľnohospodárstva*, XIV: 1–28. ISSN 1335-2571.
- Ivanová, M. Michaeli, E. Boltížiar, M. and Fazekašová, D.** (2013). The analysis of changes ecological stability of landscape in the contrasting region of the mountain range and a lowland. *Ecology, economics, education and Legislation. 13th International Multidisciplinary Scientific Geoconference SGEM 2013*. Albena; Bulgaria. 1: 925–938.
- Jurášek, P.** (1987). Analysis of crop production in the Czechoslovak Socialist Republic and in the CMEA countries (in Czech). *Zemědělská Ekonomika*, 5/1987: 357–368.
- Kabrda, J. and Jančák, V.** (2007). Impact of selected political and institutional factors on Czech agriculture and landscape. *Geografie*, 112(1): 48–60.
- Kotyza, P. and Slaboch, J.** (2014). Food Self Sufficiency in Selected Crops in the Czech Republic and Poland. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 62(6): 1329–1341.
- Kotyza, P.** (2015). Are V4 countries competitive in production of main oil-bearing crops in the perspective of production self-sufficiency and foreign trade development? *Agrarian perspectives XXIV: Global Agribusiness and the Rural Economy*, 1213-7960.
- Kriščiukaitienė, I. Galnaitytė, A. and Jedik, A.** (2009). Analysis of agricultural policy scenario impacts on Lithuanian agriculture. *Žemės ūkio mokslai*, 16(3–4): 101–112.
- Kupker, B. Hüttel, S. Kleinhanss, W. and Offermann, F.** (2006). Assessing impacts of CAP reform in France and Germany. *Agrarwirtschaft*, 55(5/6): 227–237.
- Latruffe, L. Fogarasi, J. and Desjeux, Y.** (2012). Efficiency, productivity and technology comparison for farms in Central and Western Europe: The case of field crop and dairy farming in Hungary and France. *Economic Systems*, 36(2): 264–278.
- Marsden, T. and Sonnino, R.** (2008). Rural development and the regional state: Denying multifunctional agriculture in the UK. *Journal of Rural Studies*, 24: 422–431.
- Némethová, J. Dubcová, A. and Kramáreková, H.** (2014). The Impacts of the European Union's common agricultural policy in Slovakia. *Moravian Geographical Reports*, 22(4): 51–64. DOI: <http://dx.doi.org/10.1515/mgr-2014-0023>
- Némethová, J. and Civiň, M.** (2017). Regional differences in agriculture in Slovakia after its accession to the European union. *Quaestiones Geographicae*, 36(2), 9–21. DOI: <http://dx.doi.org/10.1515/quageo-2017-0011>
- Némethová, J. Dubcová, A. and Kramáreková, H.** (2017). Slovak agriculture in 2002 - 2014 and its regional differentiations. *Geograficky Casopis*, 69(3): 281–298.
- Némethová, J. Midler, M. and Civiň, M.** (2018). Development tendencies in crop production in Slovakia after 2004 - regional differentiations. *Journal of Central European Agriculture*, 19(1): 245–269. DOI: <http://dx.doi.org/10.5513/JCEA01/19.1.2040>
- Petrovič, F. Stránovský, P. Muchová, Z. Falťan, V. Skokanová, H. Havlíček, M. Gábor, M. and Špulerová, J.** (2017). Landscape-ecological optimization of hydric potential in foothills region with dispersed settlements – a case study of Nová Bošáca, Slovakia. *Applied Ecology and Environmental Research*, 15(1): 379–400. DOI: http://dx.doi.org/10.15666/aeer/1501_379400
- Psaltopoulos, D. Balamou, E. and Thomson, K.** (2006). Rural–Urban Impacts of CAP Measures in Greece: An Inter-regional SAM Approach. *Journal of Agricultural Economics*, 57(3): 441–458.
- Ramniceanu, I. and Ackrill, R.** (2007). EU rural development policy in the new member states: Promoting multifunctionality? *Journal of Rural Studies*, 23(4): 416–429.
- Rudnicki, R.** (2009). Demographic Determinants of the Activity of Farms in Poland in the Acquisition of European Union Funds in the Years 2004–2006. *Bulletin of Geography Socio-economic Series*, 12: 45–59. DOI: <http://dx.doi.org/10.2478/v10089-009-0003-4>
- Scricciu, S.** (2011). Socioeconomic and Environmental Impacts on Agriculture in the New Europe: Post-Communist Transition and Accession to the European Union. *Routledge*, 222.

- Spišiak, P. Kusendová, D. Pavličková, K. Halás, M. Kolény, M. Zubriczký, G. Švoňavec, M., Hurbánek, P. Palúch, T. and Labuda, M.** (2005). Agro Rural Structures of Slovakia after 1989 (in Slovak) . *Geografika*. ISBN 80-969338-4-1.
- Szabo, L. Grznar, M. and Zelina, M.** (2018). Agricultural performance in the V4 countries and its position in the European Union. *Agricultural Economics*, 64(8): 337–346. DOI: <http://dx.doi.org/10.17221/397/2016-agricecon>
- Šimo, D.** (1998). Comparison of cultivation areas and yield of wheat and corn in CEFTA and EU countries (in Slovak). . *Zemědělská Ekonomika*, 44, 1998/10: 453–458.
- Štolbová, M. Hlavsa, T. Hruška, M. and Kučera, M.** (2012). Farming in Areas with Natural Constraints after the Czech Republic Accession into the EU (in Czech). *Ústav zemědělské ekonomiky a informací*, Praha. ISBN 978-80-86671-93-2
- Věžník, A.** (1989). The growth of cereal production in the Czechoslovak Socialist Republic (in Czech). *Sborník Československé geografické společnosti*, 94(2): 121–126.
- Věžník, A. Král, M. and Svobodová, H.** (2013). Agriculture of the Czech Republic in the 21st Century: From Productivism to Post-productivism. *Quaestiones Geographicae*, 32(4): 7–14. ISSN 0137-477X. DOI: <http://dx.doi.org/10.2478/quageo-2013-0029>
- Wasilewski, M. and Madra, M.** (2008). Regional differentiation of the use of production factors in the Polish agriculture. *European Countryside*, 1: 22–33. DOI: <http://dx.doi.org/10.2478/v10091/009-0003-7>

